TECHNICAL ARTICLE

How to simplify your mayonnaise production with a single stabiliser blend

BRINGING GOOD THINGS TOGETHER

Palsgaard®

Whenever a consumer chooses a low-fat mayonnaise, dressing or sauce product, he or she hopes the product will have the same taste and appearance as the full-fat variety. Sadly, however, that's seldom the case.

Palsgaard® 1-2-3 makes it possible for manufacturers to successfully produce everything from low-fat mayos, dressings and sauces to full-fat versions with a single stabiliser system. Here's what you need to know to succeed.

A quick search of online food reviews of light mayonnaise products uncovers a challenging reality for many fine foods manufacturers: Even the most complimentary remarks, such as "Tastes good – for a low-fat product" or "It's a lot like the real thing" still point to a quality gap that holds many people back from trying lower-fat products – and which stops others coming back for more.

There is help at hand, however, for manufacturers aiming to live up to consumer expectations: Decades of experience and product development in the low-fat and reduced-fat mayonnaise arena now allow recipes to be adapted and fine-tuned to an unprecedented extent.

Two sides of the same story

Essentially, two key factors are of decisive importance for closing the quality gap mentioned above. The first is knowing which stabiliser compounds to use. The second factor, which is inseparably related to the first, is knowing exactly what challenges these compounds can present, and how to unleash their full potential to achieve a consistently high-quality product. On both counts, Palsgaard has built an impressive platform that is helping manufacturers around the world to arrive at low-fat or reduced-fat mayonnaise products that are able to meet or beat consumer expectations.

TASTE

Taste is another factor which is affected by the low oil content. Because of the high amount of water in the water phase in the mayonnaise compared to a traditional mayonnaise, a higher amount of acid is needed to lower the pH value. This can make the taste more acidic, which means that a combination of different acids such as citric acid, malic acid or different types of vinegar would be preferable. Another possibility is to add flavour to the mayonnaise.

Flexibility rules

Using stabiliser compounds is not without its issues. In fact, achieving the optimal viscosity and creaminess across a variety of fat content proportions demands an extremely flexible stabiliser.

Furthermore, while most mayonnaise manufacturers seek to reduce the number of raw materials used in production, their R&D teams tend to focus on creating the optimal functional product for each project;. To meet both agendas, the industry needs a single stabiliser optimised for lower-fat applications that produces the desirable qualities associated with higher fat content. And that's why Palsgaard originally developed the stabiliser compound **Palsgaard® 1-2-3**.

Palsgaard® 1-2-3 is a compound of stabilisers based on the hydrocolloids guar gum (E412) and xanthan gum (E415) and modified starch (acetylated distarch adipate (E1422)). Not only is **Palsgaard® 1-2-3** suitable for all products with fat content ranging

from zero to 60 percent, but it also produces similar results to mayonnaises or dressings manufactured with compounds for higher fat content. And while **Palsgaard® 1-2-3** has few E-numbers, it retains the synergistic effect of the two hydrocolloids guar gum and xanthan gum. The modified starch is necessary to achieve the right structure to the mayonnaise.

Stabiliser functionality

Stabilisers affect the rheological properties of the water phase in oil-in-water emulsions. They absorb water, which increases the viscosity of the water phase. This effect is transferred to the mayonnaise or dressing products, affecting them in a number of ways:

- Increasing the product's stability against phase separation, preventing the oil and water from separating during production, distribution or storage
- Influencing the product's appearance, such as the degree of smoothness and creaminess
- Regulating the product's consistency, producing a thicker or a thinner product
- Regulating the ability of the product to absorb liquid from any drained foodstuffs added
- Affecting the sensory properties of the products, such as the mouthfeel and flavour release
- Stabilized mayonnaises and dressings are dependent on a number of factors, including:
- The oil content of the product
- The type of emulsifier used – egg yolk, protein or esters of mono- and diglycerides
- Production method – use of cold or warm-swelling stabilisers
- End-use demands, such as heat and/or freeze stability

Determining the optimal stabiliser composition requires thorough knowledge of the functional properties of each individual stabiliser.

If the stabiliser is to be used in products without egg yolk, milk proteins or emulsifying starches could be used as an emulsifier. For cold-swelling stabilisers, all the individual components in the stabiliser must be able to absorb cold water (cold-swelling ingredients). In other words, it is not necessary to heat the stabiliser in water in order to obtain the viscosity effect.

Modified starch

Modified starch enables important functionality in **Palsgaard® 1-2-3**, but it must be the right type of starch. Palsgaard's tests show that the best results are obtained using modified waxy maize starch with a high content amylum pectin. It has also been possible to mix modified starches from different starch producers with the same E-number. Fortunately, this does not increase the amount of E-numbers, and it does actually improve the effect of the modified starch by combining the best effects of the different products.

But just how much should the starches be modified? Typically, acetylated distarch (E1412) and acetylated di-starch phosphate (E1414) increase viscosity, while acetylated distarch adipate (E1442) provides more creaminess. The modified starch, acetylated distarch adipate, provided just the right balance between the effect of viscosity, creaminess, mouth-feel, stability and the degree of extra mechanical treatment the product could withstand during production.

The impact of reducing oil content

The lack of oil in a low or reduced-fat mayonnaise creates a number of additional challenges. Not only do low-fat mayonnaises have a different structure, but factors including colour, taste and texture will all be affected in various ways.

Colour

When oil is removed from the emulsion, the colour tends to be less white and more transparent. To counter this, colourings can be used, such as titanium dioxide for whiteness and beta carotene for more yellow. Other ingredients such as skim milk powder and egg yolk can also help to reduce transparency.

Taste

Because of the relatively high water volume in the water phase, more acid is needed to lower the pH value. This can cause an acidic taste, and a combination of different acids such as citric acid, malic acid or different types of vinegar may be preferable. Another option is to add particular flavours.

Texture

The texture is probably the most difficult parameter to get right when developing stabiliser compounds suitable for low-fat mayonnaises or dressings. With less oil, the product tends to be less creamy, stickier or gelled because of the high amount of water that needs to be bound. Although many different ingredients can bind water, including hydrocolloids, starches, proteins and fibres, it is important to choose the right proportions of ingredients. Hydrocolloids alone can result in a long sticky structure, and starch alone can either result in taste problems because of the high amount or cause a gelled structure. Proteins alone may cause a gelled structure and are expensive. Fibre is a good water binder, but can change the appearance of the low-fat mayonnaise. By combining the different water-binding ingredients in the right proportion, it is possible to develop a low-fat mayonnaise with a short and creamy structure.

Cold processing

The process of manufacturing these low fat mayonnaises is actually the opposite of the traditional method of producing a cold produced mayonnaise, where stabilisers such as hydrocolloids and starches are mixed with a little oil to prevent lumping and are added to the water phase before the oil is sucked into the homogenisation machine.

However, when making a low fat mayonnaise according to the above recipes, the oil content is so low that it cannot be mixed with **Palsgaard® 1-2-3**. It is therefore necessary to suck the stabiliser blend into the water. However, water should be added to egg yolk before the oil is sucked in.

After an emulsion is formed, all the dry ingredients are added. For best results, they should be mixed together to prevent lumping, but it is also possible to add them separately. Vinegar and acids are added

to complete the process. If the dry ingredients are added before the oil is emulsified in the mayonnaise, the water phase starts thickening and viscosity increases. The oil drops will be larger than if the oil was emulsified into the water phase with low viscosity, resulting in a product that is less stable and less creamy.

A single ingredient

In an effort to streamline logistics and cut costs, many mayonnaise and dressing manufacturers pursue a 'single-ingredient' strategy to take care of multiple needs. However, most stabilisers need to be optimised specifically for different products. Not only does this require further R&D effort and resources, but additional costs are also likely due to extra quality control and weighing, adjusting the variation of raw materials, traceability registration, and more hazard handling.

Palsgaard® 1-2-3 meets manufacturers' demands for a single stabiliser that can be used across a range of recipes. It has been fully tested in recipes with a fat content of between zero and 60 percent, as shown in Table 1.

This helps manufacturers simplify their production logistics and significantly reduces the administrative strains of quality control, traceability, legislation and certification.

The almost identical behaviour of the three curves indicates the same similar viscosity and creaminess across all three products.

The results may be impressive, but it is worth re-emphasising that they are unlikely to be obtained by simply applying **Palsgaard® 1-2-3** to existing recipes without bringing considerable knowledge and experience to bear – something Palsgaard, with its range of starting-point recipes, well-equipped pilot labs and lengthy track record of solving mayonnaise challenges is easily able to provide.

CONTACT US

Contact us to order samples of **Palsgaard® 1-2-3** to try out in our vast library of recipes, or visit **www.palsgaard.com** for more information.

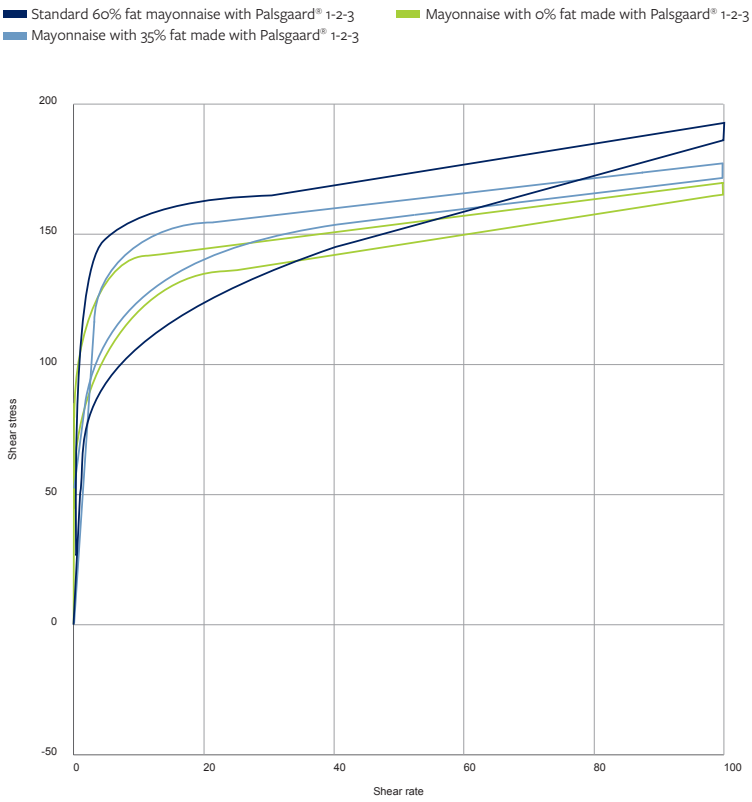

Figure 1: The flow curves show the viscosity for three different mayonnaises with contents ranging from zero to 60 percent fat content.

INGREDIENTS	0% OIL	35% OIL	60% OIL
Water	75.35%	48.25%	25.00%
Palsgaard® 1-2-3	5.00%	3.75%	2.00%
Oil	0.00%	35.00%	60.00%
Vinegar	5.00%	4.00%	4.00%
Mustard paste	0.00%	1.00%	1.00%
Skim milk powder	4.00%	0.00%	0.00%
Egg yolk	2.00%	4.00%	4.00%
Sugar	2.00%	2.80%	2.80%
Salt	1.50%	1.10%	1.10%
Titanium Oxide	0.05%	0.00%	0.00%
Preservative	0.10%	0.10%	0.10%
Total	**100 %**	**100 %**	**100 %**

Table 1: Recipe suggestions for mayonnaises with 0% fat, 35% fat and 60% fat with Palsgaard® 1-2-3 used on a Koruma.